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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/597,794

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Hironori Kumagai

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EXAMINER

OSINSKI, MICHAEL S

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/597,794	<b>Applicant(s)</b> KUMAGAI ET AL.	
	<b>Examiner</b> MICHAEL OSINSKI	<b>Art Unit</b> 2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,5 and 7-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5 and 7-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This Office action is in response to communications filed on 3/16/2010. Claims 1, 5, and 7-9 are currently pending.

#### ***Perfection of Priority***

2. The Applicant's submission of an English translation of foreign application JP 2005-154447, with a foreign filing date of 5/26/2005, is acknowledged and consequently the Tamamura reference is withdrawn as prior art. Therefore, the following action is made non-final.

#### ***Response to Arguments***

3. The Applicant's arguments with regards to the claims have been fully considered but are moot in view of the new ground(s) of rejection.

#### ***Claim Rejections – 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. ***Claims 1, 5, and 9 are rejected under 35 U.S.C 103 as being unpatentable over Nonaka et al. (US Patent 7,162,151) [hereafter Nonaka] in view of Applicant's***

***Admitted Prior Art [hereafter AAPA] and Kawahara (US Patent 7,095,001)  
[hereafter Kawahara] and Yamasaki (US PGPub 2003/0071905) [hereafter  
Yamasaki].***

6. As to claim 1, Nonaka teaches a multi-eye imaging apparatus (Fig. 1) that comprises a plurality of imaging systems comprising optical systems (11 and 16) and imaging elements (12 and 17) that have different optical axes, wherein the imaging systems include a first imaging system (11, 12, and 21) having pixel shifting means of an actuator (21) for changing a relative positional relationship between an image of a subject (110) formed on the imaging element (12) and the imaging element, and a second imaging system (16 and 17) in which a relative positional relationship between an image of a subject (110) formed on the imaging element (17) and the imaging element is fixed during time-series image capture (Col. 3, 29-53, Col. 4, 47-59).

Additionally, Nonaka discloses a recording section (15) for storing images imaged by the first imaging system at the end of an exposure period (Col. 3, 59-65) and an image memory (19a) for accumulating a plurality of frames of image information captured in time series (Fig. 2, I0, I1) during an exposure period wherein the memory is contained within a camera shake detection section (19) that compares the plurality of frames of image information accumulated in the image memory section with a comparison section (19b), moving direction calculation section (19c), and a moving amount calculation section (19d), and an image processing/forming section (22) that synthesizes the image signals contained within the image memory sections upon one

Art Unit: 2622

another (Fig. 5, 24b), corresponding to combining the plurality of frames of images accumulated in the image memory (Col. 4, 9-46, Col. 6, 26-34). Furthermore, Nonaka discloses a calculation control section (25) that calculates a magnitude of a parallax from images captured by the various imaging systems (Col. 7, 63-67, Col. 8, 1-6) and that the shake amount detection section (19), corresponding to the shake amount obtaining means, is able to obtain the shake amount after image captured is performed by changing the position of the first imaging system (11, 12, and 21) in time series is completed (Col. 11, 66-67, Col. 12, 1-3, 17-42, the process shown in Figure 15 is a modification of the process carried out after step S15 in Figure 3 which takes place after image capture is completed (taking place in S10-S14 in Fig. 3) using the first imaging system where within the process of Figure 15, the shake amount detection section obtains the shake amount and supplies the shake amount to a calculation control section 25 that forms image data using the image recorded image by the first imaging system obtained by varying the position of the imaging system during the imaging process (S5-S8 of Fig. 3) and the shake amount detected by the shake detection section after the image capturing operations are completed).

It is however noted that Nonaka fails to disclose combining images after pixels are shifted relative to each other so the resolution of the combined image is higher than that of the plurality of frames of images wherein a change amount of the positional relationship by the pixel shift means is fixed and an optimal image selecting means for selecting image information which is used in the combination of the image combining means, from image information captured by the first imaging system and image

Art Unit: 2622

information captured by the second imaging system that are accumulated in an image memory, based on the shake amount obtained by shake amount obtaining means and parallax amount obtained by parallax amount obtaining means..

On the other hand, AAPA discloses a technique called "pixel shift" (Fig. 20A-20C) for improving the resolution of an imaging apparatus. The technique involves shifting (Fig. 20B) the active region (2101) of an imaging element (P) to a different position relative to an initial position (Fig. 20A) in order to pick-up additional image data of a scene not originally captured by the imaging element, wherein the pixels of the imaging element are shifted by 1/2 of a pixel in both the horizontal and vertical directions (Fig. 20B) (Page 1, 0010). The images captured (pre-shift and post-shift) are combined and result in an image whose resolution is equivalent to an image captured using an imaging element that is doubled in size (Page 1, 0009-0012).

Additionally, Kawahara discloses an image sensing apparatus (Fig. 10) that performs image blur correction and includes an optimal image selecting means (coordinate converter 173) for selecting image information which is used in the combination of the image combining means (image combiner 174) from image information captured by an imaging system (image sensing device 161) accumulated within an image memory (171) based on a shake amount obtained by a shake amount , Col. 6, 1-obtaining means (shift detector 172) (Col. 2, 38-40, Col. 3, 26-39, Col. 4, 3-13, 39-44, 60-67, Col. 5, 33-47, 57-67, Col. 6, 1-20, the coordinate converter selects image information to be combined by the image combiner for each image stored within the image memory by shifting coordinates of a feature point within the images to have the

Art Unit: 2622

same values wherein the extraction/designation of features points and corresponding shifting of the image data are performed based on the amount of shift/difference detected by the shift detector of the extracted feature point, caused by camera shake, detected through image comparison).

Also, Yamasaki discloses an image processing method (Fig. 10) that includes selecting image information (Fig. 9) captured by an image sensing unit (Figs. 2-7) to be used in the combination of the image information (performed at s310) based on the amount of parallax calculated (performed at s302) (Page 3, 0057, -0058, Page 4, 0080, Page 5, 0082-0084, 0088-0092, Page 6, 0093-0094, 0099, the amount of parallax between captured images is calculated and based on the result, the images are modified/shifted in order to compensate for the parallax and the subsequent shifted image data are then combined to form a single composite image).

It would have been obvious to one having ordinary skill in the art at the time of invention to include selecting image information to be combined into a single image based on an obtained amount of parallax between the images as taught by Yamasaki and optimal image selecting means for selecting image information which is used in the combination of the image combining means from image information captured by an imaging system and accumulated within an image memory based on the shake amount obtained by a shake amount obtaining means as taught by Kawahara and to incorporate combining images after pixels are shifted by a fixed amount relative to each other so the resolution of the combined image is increased as disclosed by AAPA to increase the resolution of the multi-eye imaging apparatus equipped with a pixel shifting

Art Unit: 2622

means and image combining means of Nonaka because the prior art are directed towards imaging devices that combine image data captured by the image capture device and because the technique of combining images after pixels have been shifted a particular fixed amount in order to increase a resolution of an imaging element was recognized and identified by AAPA as part of the ordinary capabilities of one skilled in the art that would yield predictable a result of increasing the resolution of images captured by the multi-eye imaging apparatus to a resolution higher than that of the plurality of image frames that are synthesized by the image processing/forming section (22) of Nonaka and selecting image information stored within an image memory captured by the imaging systems of Nonaka to be used in the combination of the image combining means based on detected shake/movement and parallax amounts as taught by Kawahara and Yamasaki would enable the device of Nonaka to select specific stored image information for combination with each other to produce an image with increased resolution through the synthesizing of the images, performed by the forming section 22, that is additionally unaffected by blurring effects caused by camera shake based on the amount of shake detected by the shake detecting section of Nonaka and incorporating the parallax amount into the decision as to which combination of stored images are to be used would allow the device of Nonaka to choose the respective images for combination by taking into account the distance between images formed on the various image sensors increasing the accuracy of the selection of images best suited for combination.



Art Unit: 2622

7. As to claim 5, the Nonaka, AAPA, Kawahara, and Yamasaki references disclose all claimed subject matter with regards to the comments of claim 1.

8. As to claim 9, Nonaka teaches the optical photographing lens (11) forms a main image of a subject (110) onto an image sensor (12), which captures all incident light and corresponding colors, and that light receiving lens (16) receives reflected luminous flux from the subject and an image sensor (17), which also captures all incident light and corresponding colors, is used to form images based on the reflected luminous flux and subsequently these images are used to determine moving direction of the image sensor (12) (Col. 3, 42-53, 66-67, Col. 4, 1-8, 20-28).

Also, Yamasaki discloses an image sensing unit (Figs. 2-6) with a plurality of imaging systems having different optical axes composed of an imaging system (aperture 205b, filter 206b and sensing region 204b) for handling a red color, an imaging system (apertures 205a and 205d, filters 206a and 206d, and sensing regions 204a and 204d) for handling a green color, and an imaging system (aperture 205c, filter 206c and sensing region 204c) for handling a blue color, wherein for at least one corresponding to one color of the imaging systems corresponding to the respective colors, the number of imaging systems corresponding to the one color (green) is two or more (Page 3, 0057-0060) and the two or more imaging systems for handling the one color (green) include the first imaging system and the second imaging system (Page 4, 0080, Page 5, 0082-0083).

9. ***Claims 7-8 are rejected under 35 U.S.C 103 as being unpatentable over Nonaka et al. (US Patent 7,162,151) [hereafter Nonaka] and Applicant's Admitted Prior Art [hereafter AAPA] and Kawahara (US Patent 7,095,001) [hereafter Kawahara] and Yamasaki (US PGPub 2003/0071905) [hereafter Yamasaki], as applied to claim 1, in further view of Nakazono (Japanese Patent Publication 2003-134385) [hereafter Nakazono] published on 5/9/2003.***

10. As to claim 7, it is noted that the Nonaka, AAPA, Kawahara, and Yamasaki references fail to particularly disclose means for discriminating different subjects wherein the shake amount obtaining means obtains a shake amount for each of the different subjects and the image combining means combines images for each of the different subjects.

On the other hand, Nakazono teaches a camera (Fig. 1) that captures an image using a CCD imager (1) and using an image composition device (4) that comprises a motion vector detecting element (Fig. 2, 11, Fig. 3) that uses two pictures to discriminate subject images (Fig. 5) and determines a shake amount for the subject using a motion vector calculation part (Fig. 3, 23) and the two images used to determine a shake amount of the subject of the image are combined (Fig. 15) into an output image using a synthesizing means (Fig. 14, 92) (Page 11, 0056-0058, Page 12, 0059-0060, Page 16, 0073-0075).

It would have been obvious to one having ordinary skill in the art at the time of invention to discriminate subjects of an image and obtain shaking amounts of the

Art Unit: 2622

identified subjects as taught by Nakazono with the multi-eye imaging apparatus of Nonaka, modified with the teachings of AAPA, Kawahara, and Yamasaki, because the prior art are directed towards imaging devices that eliminate image shaking effects and because obtaining shake amounts, or movement amounts, of an imaged subject between two images would allow the device of Nonaka to determine an image shake amount for an image's subject as opposed to the entire image in order to compensate for an image where the subject itself is moving as opposed to the physical camera, resulting in an image free from shaking or blurring effects.

11. As to claim 8, the Nakazono reference discloses all claimed subject matter with regards to similar comments of claim 7. Additionally, Nakazono teaches dividing image information into a plurality of blocks (Fig. 8) and obtaining a shake amount for a plurality of blocks using block setting means (Fig. 3, 22) (Page 13, 0064-0065).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Osinski whose telephone number is (571) 270-3949. The examiner can normally be reached on Monday to Thursday 9 a.m. to 6 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2622

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MO

/Jason Chan/

Supervisory Patent Examiner, Art Unit 2622